AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing of claims in the application:

Claim 1 (currently amended): A system comprising:

a gain medium which emits light;

a diffraction grating spaced apart from the gain medium; and

a retroreflector located to reflect light incident on the diffraction grating,

where a distance between the gain medium and the diffraction grating is adjustable along an axis parallel to a direction of the light emitted by the gain medium, by an actuator which changes the distance only along that axis.

Claim 2 (original): The system of claim 1, wherein the gain medium comprises a laser diode with an antireflective coating.

Claim 3 (canceled)

Claim 4 (currently amended): The system of claim ~~3~~ 1, wherein the actuator comprises a piezoelectric actuator.

Claim 5 (currently amended): The system of claim ~~3~~ 1, wherein the actuator comprises a voice coil actuator.

Claim 6 (currently amended): The system of claim ~~3~~ 1, wherein the actuator is coupled to the gain medium.

Claim 7 (currently amended): The system of claim ~~3~~ 1, wherein the actuator is coupled to the diffraction grating.

Claim 8 (currently amended): The system of claim ~~3~~ 1, further comprising a detector located to measure one or more wavelengths of the light emitted from the gain medium, where a

signal from the detector is coupled to a closed loop feedback system to control the distance between the gain medium and the diffraction grating.

Claim 9 (previously presented): The system of claim 8, wherein the detector measures phase of the emitted light.

Claim 10 (currently amended): The system of claim ~~3~~ 1, further comprising a detector located to measure directionality of the light emitted from the gain medium, where a signal from the detector is coupled to a closed loop feedback system to control the distance between the gain medium and the diffraction grating.

Claim 11 (original): The system of claim 10, wherein the detector comprises a quadrant cell photodetector.

Claim 12 (previously presented): The system of claim 10, further comprising a pick off located between the gain medium and diffraction grating.

Claim 13 (currently amended): The system of claim 1, further comprising an additional actuator coupled to the retroreflector, to rotate the retroreflector relative to the diffraction grating.

Claim 14 (previously presented): The system of claim 13, wherein rotation of the retroreflector is centered about a pivot positioned such that a cavity length of the system changes as the retroreflector rotates.

Claim 15 (previously presented): The system of claim 13, wherein rotation of the retroreflector is centered about a pivot positioned such that a cavity length of the system does not change as the retroreflector rotates.

Claim 16 (previously presented): The system of claim 13, further comprising an encoder coupled to measure a position of the retroreflector actuator.

Claim 17 (previously presented): The system of claim 16, wherein a signal from the encoder is coupled to a closed loop feedback system to control the position of the retroreflector actuator.

Claim 18 (previously presented): The system of claim 16, wherein a signal from the encoder is calibrated with respect to the distance between the gain medium and the diffraction grating.

Claim 19 (previously presented): The system of claim 18, wherein a signal from the encoder is used to control the distance between the gain medium and the diffraction grating.

Claim 20 (previously presented): The system of claim 13, wherein the actuator comprises a voice coil actuator.

Claim 21 (original): The system of claim 20, wherein the voice coil actuator comprises a rotary voice coil actuator.

Claim 22 (original): The system of claim 20, wherein the voice coil actuator comprises a toroidal coil rotary voice coil actuator.

Claim 23 (currently amended): A method of controlling light output from a tunable external cavity laser comprising:

providing a gain medium emitting light onto a diffraction grating, and a retroreflector to reflect light from the diffraction grating;

rotating the retroreflector relative to the diffraction grating to select a wavelength of light to amplify in the gain medium; and

adjusting a distance between the gain medium and the diffraction grating to control a cavity length of the laser, by an actuator which changes the distance only along an axis parallel to a direction of the emitted light.

Claim 24 (previously presented): The method of claim 23, wherein rotating the retroreflector is accomplished by an actuator.

Claim 25 (previously presented): The method of claim 24, wherein the actuator comprises a voice coil actuator.

Claim 26 (canceled)

Claim 27 (currently amended): The method of claim ~~26~~ 23, wherein the actuator comprises a piezoelectric actuator.

Claim 28 (currently amended): The method of claim ~~26~~ 23, wherein the actuator comprises a voice coil actuator.

Claim 29 (currently amended): The method of claim ~~26~~ 23, wherein the actuator is coupled to the gain medium.

Claim 30 (currently amended): The method of claim ~~26~~ 23, wherein the actuator is coupled to the diffraction grating.

Claim 31 (previously presented): The method of claim 23, wherein a closed loop feedback system controls rotation of the retroreflector.

Claim 32 (currently amended): The method of claim 23, wherein a closed loop feedback system coupled to the actuator controls a cavity length of the laser.

Claim 33 (currently amended): A tunable external cavity laser comprising:

a gain medium, comprising a laser diode with an antireflective coating;

a diffraction grating spaced apart from the gain medium;

a piezoelectric cavity length actuator adjusting a distance between the gain medium and the diffraction grating along an axis parallel to a direction of light emitted by the gain medium, the cavity length actuator coupled to the ~~diffraction grating~~ gain medium;

a retroreflector located to reflect the light incident on the diffraction grating;

a voice coil actuator coupled to the retroreflector and rotating the retroreflector relative to the diffraction grating;

an encoder measuring a position of the voice coil actuator, where a signal from the encoder is coupled to a first closed loop feedback system to control the position of the retroreflector; and

a detector measuring directionality of light emitted from the gain medium, where a signal from the detector is coupled to a second closed loop feedback system to control the distance between the gain medium and the diffraction grating.

Claim 34 (withdrawn): A method of calibrating a tunable external cavity laser comprising:

measuring light output from the tunable external cavity laser with a detector, the detector being capable of measuring one or more wavelengths of light;

calibrating a range of motion for a retroreflector actuator of the tunable external cavity laser based on the measured light output; and

calibrating a cavity length actuator of the tunable external cavity laser with respect to a position of the retroreflector actuator based on the measured light output.

Claim 35 (withdrawn): The method of claim 34, wherein the detector is capable of measuring phase of light.

Claim 36 (withdrawn): The method of claim 34, wherein calibrating a range of motion for a retroreflector actuator comprises:

sweeping the retroreflector actuator through its range of motion;

measuring a light wavelength at each position of the retroreflector actuator; and

storing a retroreflector actuator position for each wavelength measured.

Claim 37 (new): A system comprising:

a gain medium which emits light;

a diffraction grating spaced apart from the gain medium;

a retroreflector located to reflect light incident on the diffraction grating; and

an actuator coupled to adjust the distance between the gain medium and the diffraction grating;

wherein the actuator is coupled to the gain medium, where a distance between the gain medium and the diffraction grating is adjustable along an axis parallel to a direction of the light emitted by the gain medium by the actuator.

Claim 38 (new): A method of controlling light output from a tunable external cavity laser comprising:

providing a gain medium emitting light onto a diffraction grating, and a retroreflector to reflect light from the diffraction grating;

rotating the retroreflector relative to the diffraction grating to select a wavelength of light to amplify in the gain medium; and

adjusting a distance between the gain medium and the diffraction grating to control a cavity length of the laser;

wherein adjusting the distance between the gain medium and the diffraction grating is accomplished by an actuator coupled to the gain medium.